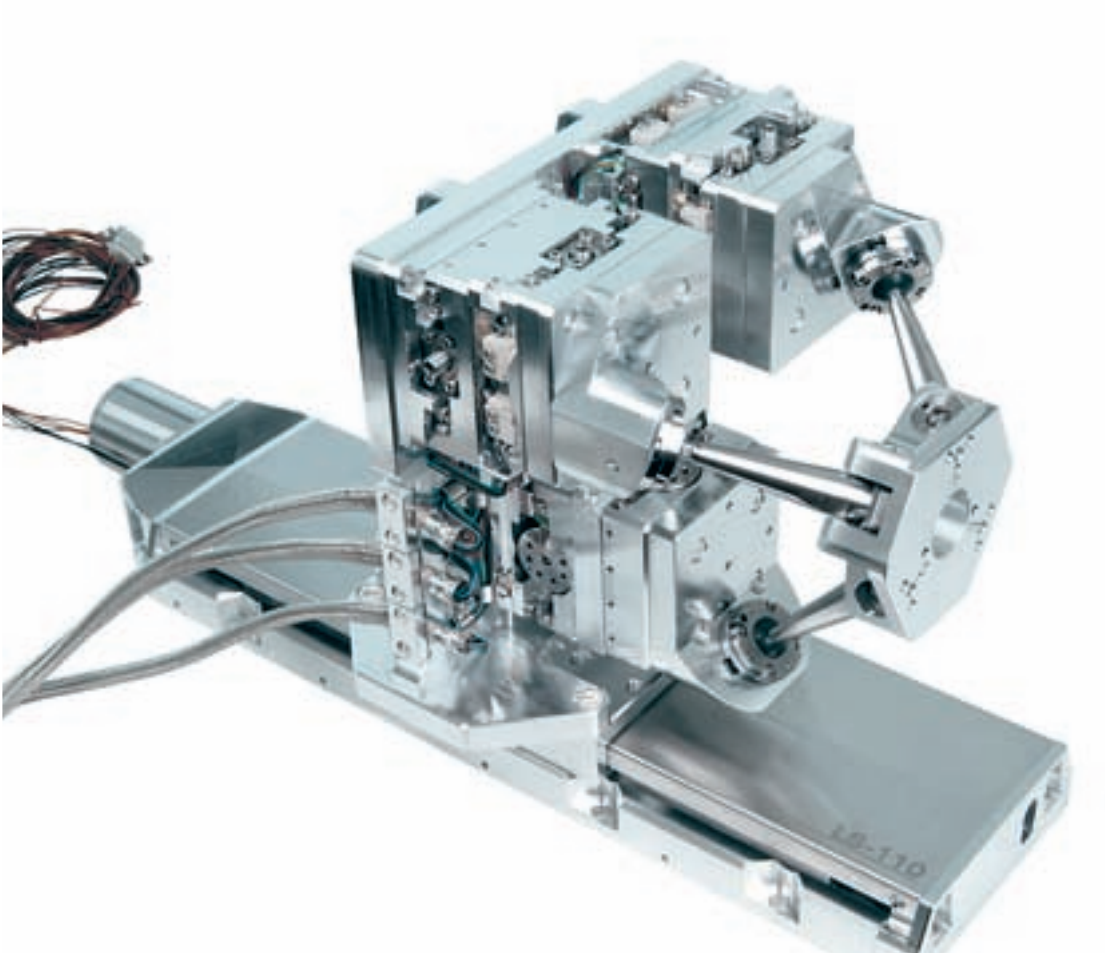


# ROBOTICS



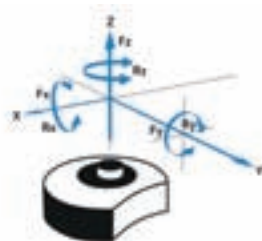
## SYNCHROTON

This 7 axes positioning system consists of a **LS-110** and a custom designed **SpaceFAB** which is used for dynamic measurements. To achieve the required precision, highstiffness and repeatability was required. The pivot point can be set by software in this case important for adjusting an X-Ray single reflection lens at BESSY II in Berlin.

# Vacuum SpaceFAB

## FACTS

Load characteristics	$F_x(N)$	$F_y(N)$	$F_z(N)$	$M_x(Nm)$	$M_y(Nm)$	$M_z(Nm)$
DC-B-034	5	5	30	0.2	0.2	0.2



## KEY FEATURES

- Six axes micro positioning system
- Compact, low profile system
- Travel ranges linear 50 x 100 x 12.7 mm
- Travel ranges rotation Rx, Ry, Rz 10°
- Load capacity 3 kg center mounted
- Automatic alignment
- Pivot point can be set by the customer
- User friendly software
- Can be used by any modern programming language
- Including software, controller and amplifiers

processes. The non-preloaded version can easily carry up to 3 kg center mounted load. The SpaceFAB SF-3000 BS is operating in closed loop and it can generate any arbitrary trajectory. The SF-3000 BS was originally developed for fiber-optic alignment applications but can be used in many other areas like optical components alignment, micro-fabrication and much more. A vacuum version of the SpaceFab is available on request.

The SpaceFAB SF-3000 BS system can perform motions in all six degrees of freedom. The low weight of the moving platform allows high dynamic positioning

## TECHNICAL DATA

Travel range	
X, Y, Z (mm)	50 x 100 x 12.7 *
Rx, Ry, Rz (°)	10, 10, 10 *
Motor (Pitch 1 mm)	DC-B-034
Speed max. X, Y, Z (mm/sec)	30
Speed max. Rx, Ry, Rz (°/sec)	10
Velocity Range (mm/sec)	0.01...30
Velocity Range (°/sec)	0.01...10
Weight (kg)	24
Bi-directional Repeatability X, Y, Z (μm)	± 0.5, ± 0.5, ± 0.5
Bi-directional Repeatability Rx, Ry, Rz (°)	± 0.0011
Resolution, calc. without load X, Y, Z (μm)	0.2
Resolution, calc. without load (height platf.) Rx, Ry, Rz (°)	depending on the position of the pivot point
Resolution typical without load X, Y, Z (μm)	0.2
Resolution typical without load Rx, Ry, Rz (°)	0.0005
Current (A)	2.3
Voltage Range (V)	24
Stiffness, theoretical Kx, Ky, Kz (N/μm)	on request
Material	Stainless steel, Aluminium black anodized

Note:

\* The maximum travel ranges in different coordinate directions (X, Y, Z, Rx, Ry, Rz) are interdependent. The data for each axis in this table shows its maximum travel, where all other axes are at their zero positions. If the other linear or rotational coordinates are not zero, the available travel may be less. For more information, please contact us. The travel range is depending on the position of the pivot point.

More info: Detailed info, concerning the motors and encoders, see: Appendix

Error and technical modifications are subject to change

APPLICATIONS

CONTROLLERS

ROBOTICS

LINEAR STAGES

ROTATION STAGES

PIEZO STAGES

MANUAL STAGES

ACCESSORIES

APPENDIX

SF-3000 BS

SF-3000 LS

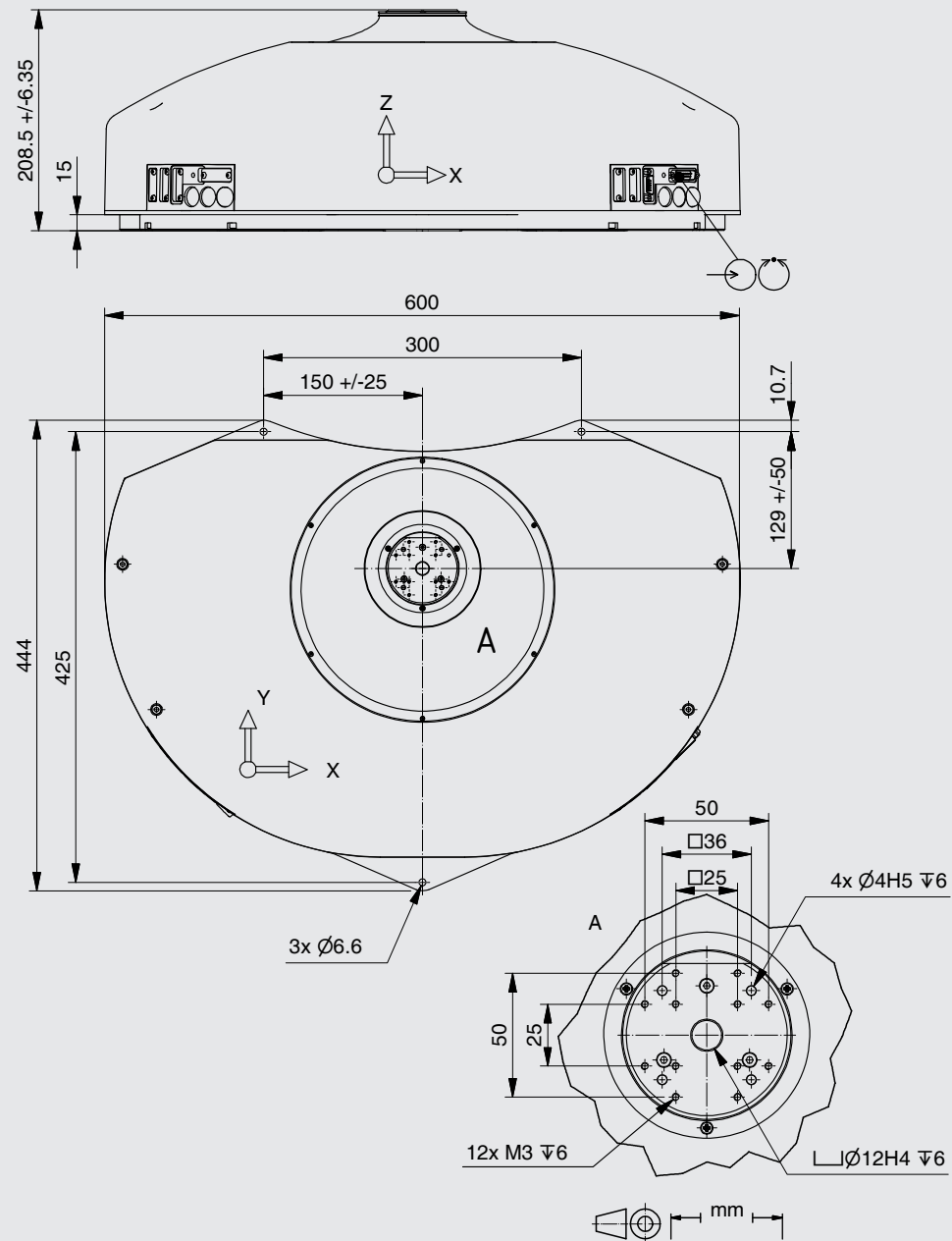
SF-2500 LS

HP-550

HP-430

HP-300

HP-140

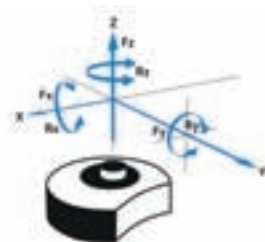


Order No. 6901-9- 1 2 1 1



FACTS

Load characteristics	$F_x(N)$	$F_y(N)$	$F_z(N)$	$M_x(Nm)$	$M_y(Nm)$	$M_z(Nm)$
2Phase-042	1.5	1.5	10	0.1	0.1	0.1



KEY FEATURES

- Six axes micro positioning system
- Compact, low profile system
- Travel ranges linear 50 x 50 x 12.7 mm
- Travel ranges rotation Rx, Ry, Rz 10°
- Load capacity 1 kg center mounted
- Automatic alignment
- Pivot point can be set by the customer
- User friendly software
- Can be used by any modern programming language
- Including software, controller and amplifiers

The SpaceFAB SF-3000 LS is a low cost alternative to PI miCos SpaceFAB SF-3000 BS and is especially designed for precision point to point positioning. The SpaceFAB SF-3000 LS system can perform motions in all six degrees of freedom. The SpaceFAB SF-3000 LS was

developed for easy alignment applications, like those required in micro-fabrication and biomedical research. The core software used for the SpaceFAB SF-3000 LS is the PI miCos Motion Server. The Motion Server includes all the mathematical transformations so that the user can start movements directly by specifying the six coordinates X, Y, Z, Rx, Ry and Rz.

TECHNICAL DATA

Travel range	
X, Y, Z (mm)	50 x 50 x 12.7 *
Rx, Ry, Rz (°)	10, 10, 10 *
Motor (Pitch 1 mm)	2Phase-042
Speed max. X, Y, Z (mm/sec)	10
Speed max. Rx, Ry, Rz (°/sec)	6
Velocity Range (mm/sec)	0.01...10
Velocity Range (°/sec)	0.01...6
Weight (kg)	24
Bi-directional Repeatability X, Y, Z (μm)	± 5, ± 5, ± 5
Bi-directional Repeatability Rx, Ry, Rz (°)	± 0.011
Resolution, calc. without load X, Y, Z (μm)	0.2
Resolution, calc. without load (height platf.) Rx, Ry, Rz (°)	depending on the position of the pivot point
Resolution typical without load X, Y, Z (μm)	0.5
Resolution typical without load Rx, Ry, Rz (°)	0.003
Current (A)	1.2
Voltage Range (V)	24
Stiffness, theoretical Kx, Ky, Kz (N/μm)	on request
Material	Stainless steel, Aluminum black anodized

Note:  
 \* The maximum travel ranges in different coordinate directions (X, Y, Z, Rx, Ry, Rz) are interdependent. The data for each axis in this table shows its maximum travel, where all other axes are at their zero positions. If the other linear or rotational coordinates are not zero, the available travel may be less.  
 For more information, please contact us, for turned key solutions, please contact us. The travel range is depending on the position of the pivot point.

More info: Detailed info, concerning the motor, see: Appendix

APPLICATIONS

CONTROLLERS

ROBOTICS

LINEAR STAGES

ROTATION STAGES

PIEZO STAGES

MANUAL STAGES

ACCESSORIES

APPENDIX

SF-3000 BS

SF-3000 LS

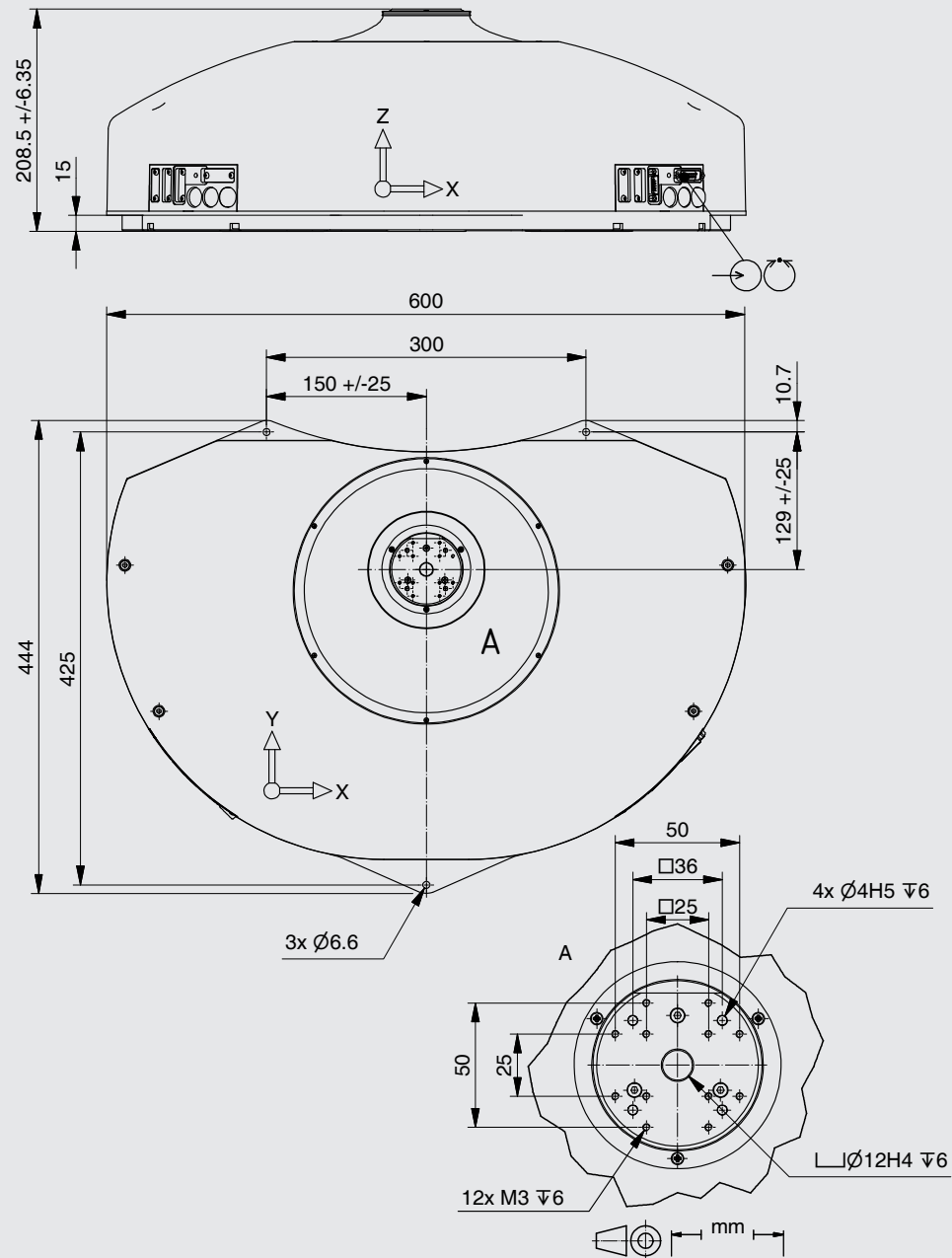
SF-2500 LS

HP-550

HP-430

HP-300

HP-140

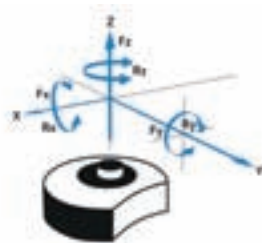


Order No. 6902-9- 2 0 0 2



FACTS

Load characteristics	$F_{x(N)}$	$F_{y(N)}$	$F_{z(N)}$	$M_{x(Nm)}$	$M_{y(Nm)}$	$M_{z(Nm)}$
2Phase-018	0.2	3	0.2	0.1	0.1	0.1



KEY FEATURES

- Six axes micro positioning system
- Compact, low profile system
- Travel ranges linear 5 x 5 x 3.5 mm
- Travel ranges rotation Rx, Ry, Rz  $\pm 5^\circ$
- Load capacity 0.3 kg center mounted
- Automatic alignment
- Pivot point can be set by the customer
- User friendly software
- Can be used by any modern programming language
- Including software, controller and amplifiers



SpaceFAB SF-2500 LS was especially developed for easy alignment applications, micro-fabrication and biomedical research. The core software used for the SpaceFAB SF-2500 LS is the PI miCos Motion Server. The Motion Server includes all the mathematical transformations so that the user can start movements directly by specifying the six coordinates X, Y, Z, Rx, Ry and Rz.

TECHNICAL DATA

Travel range	
X, Y, Z (mm)	5 x 5 x 3.5 *
Rx, Ry, Rz (°)	5, 5, 5 *
Motor (Pitch 1 mm)	2Phase-018
Speed max. X, Y, Z (mm/sec)	5
Speed max. Rx, Ry, Rz (°/sec)	5
Velocity Range (mm/sec)	0.01...5
Velocity Range (°/sec)	0.01...5
Weight (kg)	2.3
Bi-directional Repeatability X, Y, Z (µm)	$\pm 8, \pm 8, \pm 8$
Bi-directional Repeatability Rx, Ry, Rz (°)	$\pm 0.02$
Resolution, calc. without load X, Y, Z (µm)	2.5
Resolution, calc. without load (height platf.) Rx, Ry, Rz (°)	depending on the position of the pivot point
Resolution typical without load X, Y, Z (µm)	2
Resolution typical without load Rx, Ry, Rz (°)	0.03
Current (A)	0.24
Voltage Range (V)	24
Stiffness, theoretical Kx, Ky, Kz (N/µm)	on request
Material	Aluminum black anodized

Note:  
 \* The maximum travel ranges in different coordinate directions (X, Y, Z, Rx, Ry, Rz) are interdependent. The data for each axis in this table shows its maximum travel, where all other axes are at their zero positions. If the other linear or rotational coordinates are not zero, the available travel may be less. For more information, please contact us. The travel range is depending on the position of the pivot point.

More info: Detailed info, concerning the motors and encoders, see: Appendix





## 3.070 Hexapod HP-550



### FACTS

Load characteristics	$F_{x(N)}$	$F_{y(N)}$	$F_{z(N)}$
DC-B-027	300	300	500



### KEY FEATURES

- Six axes Parallel Kinematic System
- Travel ranges linear 100x100x100 mm
- Travel ranges rotation Rx, Ry 40°, Rz 60°
- Maximum speed 2 mm/sec
- Pivot Point can be set by the customer
- User friendly software
- Load capacity central (Fx; Fy) 30 kg / (Fz) 50 kg

cations include antenna positioning, medical research, laser technology, semiconductor technology and optical systems. An optimized design insures maximum system stiffness and spatial resolutions up to 0.5  $\mu\text{m}$ . Vacuum versions are available on request. The system use a Delta-Tau controller includes advanced algorithms for inverse kinematic transformations within a user-friendly software package.

### TECHNICAL DATA

Travel range	
X, Y, Z (mm)	100 x 100 x 100 *
Rx, Ry, Rz (°)	40, 40, 60 *
Motor (Pitch 1 mm)	DC-B-027
Speed max. X, Y, Z (mm/sec)	2
Speed max. Rx, Ry, Rz (°/sec)	1
Velocity Range (mm/sec)	0.01...2 **
Velocity Range (°/sec)	0.001...1 **
Weight (kg)	33
Bi-directional Repeatability X, Y, Z ( $\mu\text{m}$ )	$\pm 4, \pm 4, \pm 3$
Bi-directional Repeatability Rx, Ry, Rz (°)	$\pm 0.002$
Resolution, calc. without load X, Y, Z ( $\mu\text{m}$ )	0.016
Resolution, calc. without load (height platf.) Rx, Ry, Rz (°)	depending on the position of the pivot point
Resolution typical without load X, Y, Z ( $\mu\text{m}$ )	0.5
Resolution typical without load Rx, Ry, Rz (°)	0.00057
Current (A)	0.9
Voltage Range (V)	24
Stiffness, theoretical Kx, Ky, Kz (N/ $\mu\text{m}$ )	on request
Material	Stainless steel, Aluminum black anodized

Note:

\* The maximum travel ranges in the different coordinate directions (X, Y, Z, RX, RY, RZ) are interdependent. The data for each axis in this table shows its maximum travel, where all other axes are at their zero positions. If the other linear or rotational coordinates are not zero, the available travel may be less.

\*\* leg speed

More info: Detailed info, concerning the motors and encoders, see: Appendix

Error and technical modifications are subject to change



## 3.072 Hexapod HP-430

### FACTS

Load characteristics	$F_x(N)$	$F_y(N)$	$F_z(N)$
DC-B-027	300	300	500



### KEY FEATURES

- Six axes Parallel Kinematic System
- Travel ranges linear 50x50x30 mm
- Travel ranges rotation Rx, Ry 20°, Rz 40°
- Maximum speed 1 mm/sec
- Pivot Point can be set by the customer
- User friendly software
- Load capacity central (  $F_x$ ;  $F_y$  ) 30 kg / (  $F_z$  ) 50 kg



s include antenna positioning, medical research, optical systems and synchrotron setups. An optimized design insures maximum system stiffness and spatial resolutions up to 0.5  $\mu\text{m}$ . Vacuum versions are available on request. The system use a Delta-Tau controller includes advanced algorithms for inverse kinematic transformations within a user-friendly software package.

### TECHNICAL DATA

Travel range	
X, Y, Z (mm)	50 x 50 x 30 *
Rx, Ry, Rz (°)	20, 20, 40 *
Motor (Pitch 1 mm)	DC-B-027
Speed max. X, Y, Z (mm/sec)	1
Speed max. Rx, Ry, Rz (°/sec)	0.5
Velocity Range (mm/sec)	0.01...1 **
Velocity Range (°/sec)	0.001...0.5 **
Weight (kg)	25
Bi-directional Repeatability X, Y, Z ( $\mu\text{m}$ )	$\pm 3, \pm 3, \pm 2$
Bi-directional Repeatability Rx, Ry, Rz (°)	$\pm 0.002$
Resolution, calc. without load X, Y, Z ( $\mu\text{m}$ )	0.01
Resolution, calc. without load (height platf.) Rx, Ry, Rz (°)	depending on the position of the pivot point
Resolution typical without load X, Y, Z ( $\mu\text{m}$ )	0.5
Resolution typical without load Rx, Ry, Rz (°)	0.00057
Current (A)	0.9
Voltage Range (V)	24
Stiffness, theoretical Kx, Ky, Kz (N/ $\mu\text{m}$ )	on request
Material	Stainless steel, Aluminum black anodized

Note:

\* The maximum travel ranges in the different coordinate directions ( X, Y, Z, RX, RY, RZ ) are interdependent. The data for each axis in this table shows its maximum travel, where all other axes are at their zero positions. If the other linear or rotational coordinates are not zero, the available travel may be less.

\*\* leg speed

More info: Detailed info, concerning the motors and encoders, see: Appendix

## APPLICATIONS

## CONTROLLERS

## ROBOTICS

## LINEAR STAGES

## ROTATION STAGES

## PIEZO STAGES

## MANUAL STAGES

## ACCESSORIES

## APPENDIX

SF-3000 BS

SF-3000 LS

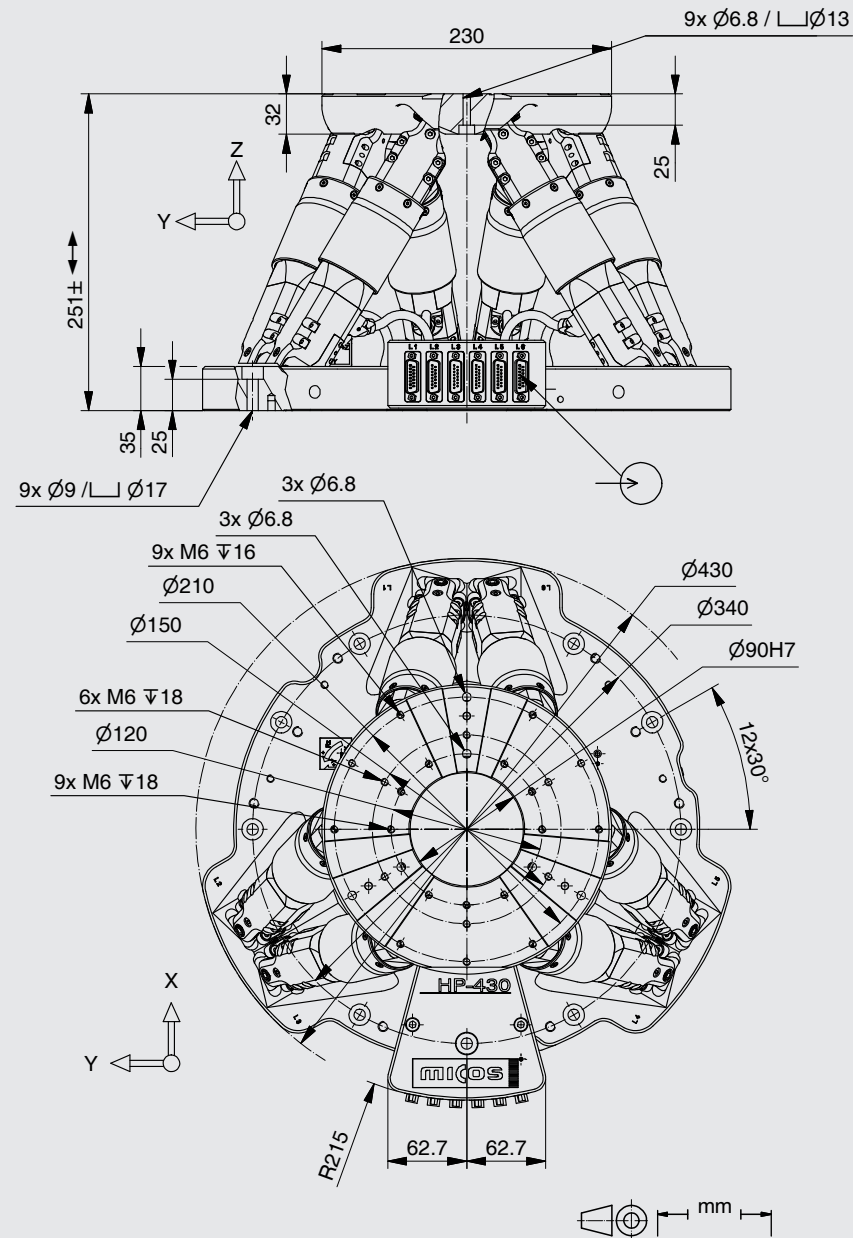
SF-2500 LS

HP-550

**HP-430**

HP-300

HP-140



Order No. 6010-9-1 0 0 3

## 3.074 Hexapod HP-300

### FACTS

Load characteristics	$F_{x(N)}$	$F_{y(N)}$	$F_{z(N)}$
DC-B-010	40	40	100



### KEY FEATURES

- Six axes Parallel Kinematic System
- Travel ranges linear 44x44x30 mm
- Travel ranges rotation Rx, Ry 18°, Rz 25°
- Maximum speed 2 mm/sec
- Pivot Point can be set by the customer
- User friendly software
- Load capacity central (Fx; Fy) 4 kg / (Fz) 10 kg



With a Hexapod HP-300 system motions in all six degrees of freedom can be achieved. Due to the parallel kinematic design principle of Hexapods, a much higher system stiffness is achieved than with conventional stacked stages. The low weight of the moving platform allows highly dynamic positioning processes. Hexapods are especially suited for

applications of precision positioning. The HP-300 is especially designed for applications with limited space conditions. An optimized general concept allows maximum stiffness and accuracy. The system use a Delta-Tau controller includes advanced algorithms for inverse kinematic transformations within a user-friendly software package. Vacuum versions are available on request.

### TECHNICAL DATA

Travel range	
X, Y, Z (mm)	44 x 44 x 30 *
Rx, Ry, Rz (°)	18, 18, 25 *
Motor (Pitch 1 mm)	DC-B-010
Speed max. X, Y, Z (mm/sec)	3
Speed max. Rx, Ry, Rz (°/sec)	2
Velocity Range (mm/sec)	0.01...0.3 **
Velocity Range (°/sec)	0.001...2 **
Weight (kg)	5.8
Bi-directional Repeatability X, Y, Z (µm)	± 3, ± 3, ± 1
Bi-directional Repeatability Rx, Ry, Rz (°)	± 0.0028
Resolution, calc. without load X, Y, Z (µm)	0.022
Resolution, calc. without load (height platf.) Rx, Ry, Rz (°)	depending on the position of the pivot point
Resolution typical without load X, Y, Z (µm)	0.5
Resolution typical without load Rx, Ry, Rz (°)	0.001
Current (A)	0.08
Voltage Range (V)	12
Stiffness, theoretical Kx, Ky, Kz (N/µm)	on request
Material	Stainless steel, Aluminum black anodized

Note:

At present with DC-motor.

\* The maximum travel ranges in the different coordinate directions (X, Y, Z, RX, RY, RZ) are interdependent. The data for each axis in this table shows its maximum travel, where all other axes are at their zero positions. If the other linear or rotational coordinates are not zero, the available travel may be less.

\*\* leg speed

More info: Detailed info, concerning the motor, see: Appendix





## 3.076 Hexapod HP-140

### FACTS

Load characteristics	$F_{x(N)}$	$F_{y(N)}$	$F_{z(N)}$
DC-B-009	20	20	50



### KEY FEATURES

- Six axes Parallel Kinematic System
- Travel ranges linear 32 x 32 x 12 mm
- Travel ranges rotation Rx, Ry 12°, Rz 20°
- Maximum speed 1 mm/sec
- Pivot Point can be set by the customer
- User friendly software
- Load capacity central (Fx; Fy) 2kg / (Fz) 5 kg



With a Hexapod HP-140 system motions in all six degrees of freedom can be achieved. Due to the parallel kinematic design principle of Hexapods, a much higher system stiffness is achieved than with conventional stacked stages. The low weight of the moving platform allows highly dynamic positioning processes. Hexapods are especially suited for applications of precision positioning. Hexapods are suitable for antenna

positioning, medical technology, laser technology, semiconductor technology and for optical systems. The HP-140 is especially designed for applications with limited space conditions. An optimized general concept allows maximum stiffness and accuracy. The system use a Delta-Tau controller includes advanced algorithms for inverse kinematic transformations within a user-friendly software package. Vacuum versions are available on request.

### TECHNICAL DATA

Travel range	
X, Y, Z (mm)	32 x 32 x 12 *
Rx, Ry, Rz (°)	12, 12, 20 *
Motor (Pitch 1 mm)	DC-B-009
Speed max. X, Y, Z (mm/sec)	1
Speed max. Rx, Ry, Rz (°/sec)	0.5
Velocity Range (mm/sec)	0.01...1 **
Velocity Range (°/sec)	0.01...0.5 **
Weight (kg)	1.7
Bi-directional Repeatability X, Y, Z (µm)	± 3, ± 3, ± 1
Bi-directional Repeatability Rx, Ry, Rz (°)	± 0.003
Resolution, calc. without load X, Y, Z (µm)	0.0064
Resolution, calc. without load (height platf.) Rx, Ry, Rz (°)	depending on the position of the pivot point
Resolution typical without load X, Y, Z (µm)	0.5
Resolution typical without load Rx, Ry, Rz (°)	0.001
Current (A)	0.32
Voltage Range (V)	12
Stiffness, theoretical Kx, Ky, Kz (N/µm)	on request
Material	Stainless steel, Aluminum black anodized

Note:

\* The maximum travel ranges in the different coordinate directions (X, Y, Z, RX, RY, RZ) are interdependent. The data for each axis in this table shows its maximum travel, where all other axes are at their zero positions. If the other linear or rotational coordinates are not zero, the available travel may be less.

\*\* leg speed

APPLICATIONS

CONTROLLERS

ROBOTICS

LINEAR STAGES

ROTATION STAGES

PIEZO STAGES

MANUAL STAGES

ACCESSORIES

APPENDIX

SF-3000 BS

SF-3000 LS

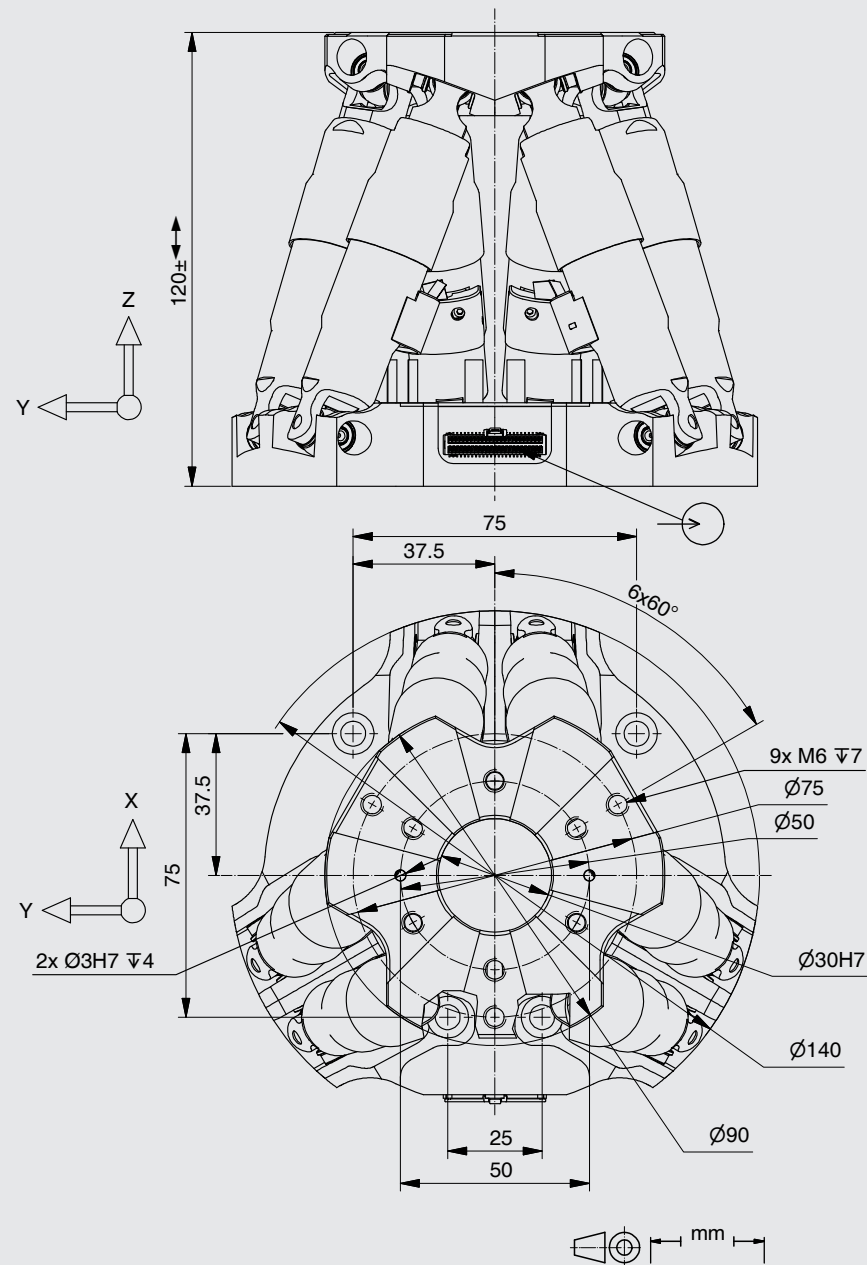
SF-2500 LS

HP-550

HP-430

HP-300

HP-140



Order No. 6030-9-1 0 0 3 0

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